Q3: What does "sufficiently impervious secondary containment" typically mean regarding construction methods and materials at an MRW fixed facility?

A3: Sufficiently impervious secondary containment depends on the substance that requires containment. For moderate risk wastes (MRW), the substances that need to be contained include hazardous materials from a broad spectrum of chemical types. In 2001 the top seven quantities of MRW collected statewide, excluding used oil collected at used oil collection sites, are shown in the table below.

2001 HHW and CESQG Collected, Except Used Oil sites

Top 7 MRW Types	HHW	CESQG	Total	Percent
Lead Acid Batteries	5,467,759	70,863	5,538,622	33.3%
Latex Paint	2,936,810	53,460	2,990,270	18.0%
Oil-Based Paint	2,521,531	140,807	2,662,338	16.0%
Oil, Noncontaminated	1,662,269	291,022	1,953,291	11.8%
Flammable Liquids	1,591,521	210,847	1,802,368	10.8%
Antifreeze	358,777	82,336	441,113	2.7%
Pesticide/Poisons Liquid	253,268	7,911	261,179	1.6%

The type of secondary containment that would be sufficiently impervious for lead acid batteries could be a sealed/coated asphalt concrete containment pad. Asphalt is relatively impervious to battery acid. However, for oil-based paint, oil, or flammable liquids, asphalt concrete would be inappropriate. These three MRW types, that together represent over 38 percent of the total waste stream (MRW types highlighted in red in the table above), are liquid hydrocarbons (petroleum products) which will dissolve asphalt concrete pavement. Hydrocarbon wastes should not be stored over blacktop because it is not sufficiently impervious. (See image of dissolved asphalt from hydrocarbon spillage below.) In addition, some solvents, which are typically in the flammable liquids category, have been shown to readily pass through cement concrete slabs and into the soils and groundwater below.

The recommended containment at a fixed facility for these liquid hydrocarbon wastes is cement concrete coated with a chemically-resistant coating, usually an epoxy-based product.

Asphalt dissolved by petroleum products

Ecology has developed guidance that should be used to help determine what would constitute sufficiently impermeable secondary containment. There is a general guidance document for hazardous wastes, which is available on the Ecology website, Guidance for Assessing Dangerous Waste Secondary Containment Systems. An excerpt from this document states some of the basic secondary containment permeability limitations of bare cement concrete.

"Concrete not otherwise protected by application of a coating or sealant is relatively permeable to liquids and is susceptible to chemical attack from releases or spills of liquid dangerous wastes. The porous nature of unprotected concrete will allow any spills or releases of certain dangerous wastes, particularly solvents and various organic chemicals, to readily penetrate through the concrete into the underlying soil. This will result in soil contamination even if the overlying concrete is relatively unaffected."

Pesticide/Poison liquids is another major category of MRW collected, listed seventh in the table above. The pesticide/poison liquid category represents less than 2 percent of the total MRW waste stream by quantity. However, other categories of poisons, including solid pesticides and poisons, and pesticides in combination with flammable liquids or in aerosol containers, add another full 1 percent to the total MRW waste stream. This is typically the most acutely toxic part of the MRW stream and consequently calls for special handling.

Some pesticide products are carried in a flammable liquid media and therefore asphalt is not a sufficiently impervious form of secondary containment. Further, some pesticides will degrade the actual chemical bonds of exposed cement concrete. This causes the concrete structure to crack and crumble. A typical solution is to use cement concrete coated with chemically-resistant epoxy. Chemically-resistant epoxy coatings typically have a limited ability to flex or stretch. Asphalt concrete by its nature is quite flexible and usually not an appropriate base for epoxy coatings. Therefore a properly prepared cement concrete base is the standard for secondary containment.

Before a chemically-resistant epoxy coating is applied to cement concrete, the surface of the slab needs to be prepared properly; otherwise, the epoxy will not effectively adhere to the surface. Epoxy coatings have been placed at MRW facilities without preparing the slab surface. In most cases this has resulting in epoxy separating from the surface in traffic areas. Most manufacturers of epoxy coatings suggest that after the concrete slab is cured, the surface cement layer needs to be removed to allow access to the fine aggregate particles in the slab. This is usually done by specialty coating contractors using machines designed for this purpose. The slab surface is then cleaned of the cement dust and the epoxy applied, often "built-up" in one or more layers or a base/primer layer followed by finish layer(s).

The top layer of coating often includes additives or is worked to a consistency to increase the traction of the walking surface in case the floor is wet due to a spill or water from normal floor cleaning. Some epoxies need specific temperatures and humidity ranges to properly cure and provide the desired chemical-resistance properties of the coating system. This will be stated clearly by the manufacturer of the product, and their directions should be followed closely by the installer.